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THE IDENTITIES OF THE SAND CHERRIES OF EASTERN AMERICA.

M. L. FERNALD.

THE Sand Cherries of eastern America long passed as a highly variable species under the inclusive name *Prunus pumila* L. To be sure, other species, such as *P. susquehanae* Willd.¹ *P. depressa* Pursh² and *P. cuneata* Raf.,³ were proposed; but not until Bailey,⁴ in 1892, took up *P. cuneata* did modern botanists recognize that at least two species were passing as *P. pumila*. Subsequently *P. pumila* and *P. cuneata* have been maintained as species, but neither in Bailey's several treatments nor in Wight's *Native American Species of Prunus*⁵ have more than these two been recognized as occurring in eastern America.

Living as a boy on the banks of the Penobscot and subsequently botanizing extensively from New England to Labrador, the writer has always been familiar with the Sand Cherry, "Beach Plum" or *Cerise de Sable* which forms such extensive carpets, with its absolutely prostrate and repent rope-like branches trailing in the sands or gravels or over the ledges of the river-banks of New Hampshire, Maine, New Brunswick and Quebec, where its juicy black "plums" are highly prized either raw, cooked or as the source of a rich syrup-like jelly. This is the shrub described by Michaux⁶ as *Cerasus pumila*: "Fruticulus prostratus. Fructus parvus, niger, edulis,"

¹ Willd. *Enum. Pl. Hort. Berol.* 519 (1809).

² Pursh, *Fl. Am.* Sept. i. 332 (1814).

³ Raf. *Ann. Nat.* 11 (1820).

⁴ Bailey, *Cult. Native Plums and Cherries*, 63 (1892).

⁵ Wight, *Native American Species of Prunus*,—U. S. Dept. Agric. Bull. No. 179 (1915).

⁶ Michx. *Fl. Bor.-Am.* i. 286 (1803).

Michaux's material, as shown in his herbarium and by his journal, coming from Lake St. John and Mistassini River in northern Quebec. This prostrate northern shrub, which abounds from eastern Gaspé Co. to Mistassini River, Quebec, southward across New Brunswick, Maine and New Hampshire, extending westward at least to the Ottawa, the Hudson and the Delaware systems, was described by Pursh as *Prunus depressa*, with the illuminating comment: "This low shrub, which spreads its branches very much and does not rise above one foot from the ground, is known by the name of *Sand-cherrries*. The fruit is black, small, and agreeably tasted."

Familiar with Pursh's *Prunus depressa*, which in 1892 Bailey treated¹ as typical *P. pumila* but which he subsequently seems to have ignored, the writer was, therefore, puzzled to make his own experience fit Bailey's later descriptions of *P. pumila*: "Decumbent at the base when old, but the young growth strictly erect and often reaching 5-8 ft. in height, . . . fruit . . . small and usually scarcely edible"² or Wight's equally definite: "shrub 1½ to 5 feet high, . . . erect when young." When, however, on visiting the sand dunes of Lake Ontario in Oswego County, New York, with Professors Wiegand and Eames, he made the acquaintance of the upright shrub of the Great Lakes, it at once became apparent that the Great Lake *P. pumila* was quite distinct from *P. depressa*. Differing in its prostrate habit, more palatable fruit and more north-eastern range, *P. depressa* is also distinguished by its leaves being less acuminate and often obtusely spatulate, thinner, less prominently veiny but more glaucous beneath, and usually with more crenate teeth, by its commonly shorter and less fimbriate stipules and by its more elongate, ellipsoid rather than subglobose or ovoid, stones.

In determining to which of these shrubs we should apply the name *Prunus pumila*, Bailey, as already noted, stated that "Linnaeus' characterization" shows "that Linnaeus meant to describe the prostrate plant." But this is not indicated by the definite statement of Linnaeus that *P. pumila* has "the stature of *Amygdalus nana*,"³ a species "2-5 feet high."⁴ Linnaeus took the name *pumila* from

¹ "Miller's figure, so far as it goes, and Linnaeus' characterization, show that Linnaeus meant to describe the prostrate and long-leaved plant"—Bailey, Cult. Native Plums and Cherries, 62 (1892).

² Bailey, Cycl. Am. Hort. 1450 (1901).

³ L. Mant. 75 (1767).

⁴ Boissier, Fl. Orient. ii. 644 (1872).

Cerasus canadensis pumila of Duhamel.¹ Duhamel's description gives little information but the fuller account by Miller (also cited by Linnaeus) states that the shrub is at least "Three or four feet high."² It is thus clear that *P. pumila* is the upright narrow-leaved shrub so characteristic of the Great Lake region.

The western range of *Prunus depressa* is not yet determined. It reaches the Ottawa valley and in the Connecticut system extends south into Franklin County, Massachusetts. Torrey's *Cerasus pumila* with "Stem trailing, 2-3 feet long,"³ from Lake Champlain and the Hudson may belong here but all the specimens seen from the Champlain Valley in Vermont are *P. cuneata*. Here apparently belongs the shrub of the sandy shore of Long Lake in the Adirondacks, described by Peck⁴ as "the prostrate trailing" *P. pumila*; and the shrub of the flats of the Delaware River is clearly *P. depressa*, as Porter's description of the two Pennsylvanian species indicates: "One [*P. pumila*]⁵ [i. e. *P. depressa*] grows on the islands and flats of the Delaware, which are composed of gravel and cobblestone drift washed bare by the floods, and are treeless. Here it grows, sending out on all sides strong prostrate branches, often as thick as a man's arm, which form flat patches six feet or more in diameter. The branches are so close together that they hold the fine sand and mud and create low mounds or hillocks, and in the proper season the spaces between them are black with the fruit. The other [*P. cuneata*]⁶ occurs in southeastern Pennsylvania on the borders of swamps and remote from river bottoms. It is strictly erect and attains the height of four feet."⁷

In studying the descriptions of the various Sand Cherries it has become apparent that *Prunus susquehanae* Willd. (1809) is the earliest and entirely valid name for the erect shrub with oblong to oblong-obovate leaves which was described in 1820 by Rafinesque as *P. cuneata*. Under the latter name this species is thus well described by Bailey: "The leaves are short and usually blunt, obovate, spatulate or when full grown sometimes elliptic-ovate, the teeth few

¹ Duham. *Traité des Arbres et Arbustes* i. 149 (1755).

² Mill. *Fig. Pl.* i. 60, t. 89, fig. 2 (1760).

³ Torr. *Fl. N. Y.* i. 195 (1843).

⁴ Peck, 34th Ann. Rep. State Mus. N. Y. 53 (1891).

⁵ Name inserted in quotation by L. H. Bailey.

⁶ Name inserted in quotation by L. H. Bailey.

⁷ Porter as quoted by Bailey, *The Cultivated Native Plums and Cherries*, 64 (1892).

and the points appressed."¹ Similarly Wight describes it: "Leaves broadly lanceolate . . . or sometimes even obovate to elliptic or elliptic-obovate . . . usually serrate from below the middle . . . pale or even somewhat glaucous-like below." How closely these descriptions of *P. cuneata* match Willdenow's account:

"*17. *PRUNUS Susquehanae.*

P. pedunculis subsolitariis, foliis obovato-oblongis, subtus glaucis, serratis, basi integerrimis.

Prunus Susquehanae Hortulan.

Habitat in America boreali."

The identity of *Prunus susquehanae* and *P. cuneata* is further shown by the fact that this shrub is well known in eastern Pennsylvania, as indicated by Porter's statement above quoted, by Long's reference to it as "on rocky slopes and summits of the Poconos and Kittatinneys,"² by Clute's getting it on a "Wooded hillside"³ of the Upper Susquehanna, by characteristic specimens from Lancaster County nearer the mouth of the Susquehanna, and by Rafinesque's citation of the original locality of his *P. cuneata*: "On the mountains of Pennsylvania."

Briefly summarized, the nomenclature and ranges of our three Sand Cherries may be stated as follows.

PRUNUS PUMILA L. Mant. 75 (1767); Bailey, Cycl. Am. Hort. 1450 (1901); Wight, Native Am. Sp. *Prunus*, 65 (1915). *Cerasus canadensis* Mill. Gard. Dict. ed. 8. (1768). *C. glauca* Moench, Meth. 672 (1794). *C. pumila* (L.) Michx. Fl. Bor.-Am. i. 286 (1803) as to name-bringing synonym only.

The following are characteristic specimens. NEW YORK: sand dunes by L. Ontario, Selkirk, *Fernald, Wiegand & Eames*, no. 14,355. ONTARIO: shore of L. Ontario, Wellington, *Fowler*; Pt. Edward, L. Huron, *J. Macoun*, no. 34,728; Johnston's Harbor, L. Huron, *J. Macoun*, no. 34,727; sandy shore of L. Superior, Agawa Bay, *Pease*, no. 18,049. MICHIGAN: sand hills, New Buffalo, *Lansing*, no. 3259; Castle Park, *Greenman*, no. 2408; sandy soil, border of Douglas Lake, *Ehlers*, no. 316; gravelly soil, Goose Island, *Ehlers*, no. 429. INDIANA: sand dunes by L. Michigan, Indiana Harbor, *Hill*, no. 118; sand ridges near L. Michigan, Edgemoor, *Lansing*, no. 2695; tops of new dunes, Port Chester, *Peattie*. ILLINOIS: shores of L. Michigan, Chicago, *Vasey et al.*; sand dunes by L. Michigan near Beach, *Greenman*, nos. 1992, 2025. WISCONSIN: Rock Co., *Hale*.

¹ Bailey, l. c. 63 (1892).

² Long, RHODORA, xviii. 69 (1916).

³ Clute, Fl. Upper Susq. Suppl. 1: 4 (1901) as *P. pumila*.

P. DEPRESSA Pursh, Fl. Am. Sept. i. 332 (1814). *Cerasus pumila* Michx. Fl. Bor.-Am. i. 286 (1803) as to shrub described. *P. pumila* Torr. Fl. N. Y. i. 195 (1843), not L.

The following are typical specimens. QUEBEC: beach of Grand River, Gaspé Co., *G. H. Richards*; ledgy banks of Restigouche River, Matapedia, *Fernald*; Grand Discharge, Lake St. John, *Kennedy* (form with unusually broad leaves and short stones); shores, Oka, *Victorin*, no. 670. NEW BRUNSWICK, Tom's Island, Restigouche River, *Hay*. MAINE: gravel beach of St. John River, Township XII, Range 16, *St. John & Nichols*, no. 2357; gravelly shore of St. John R., *St. Francis*, *Fernald*, no. 28; gravelly river beach, Fort Kent, *Fernald*, no. 2292, *Robinson & Fernald*, no. 223; *Pease*, no. 2333; beach of Aroostook River, Fort Fairfield, *Fernald*, no. 1951; argillaceous ledges by Penobscot River, Winn, *Fernald & Long*, no. 13,947; argillaceous ledges by Penobscot R., Milford, *Fernald*, no. 13,945; rocky bank of Kennebec River, Caratunk, *Fernald*; sandy shores of Kennebec R., Skowhegan, *Furbish*; river gravel of Sandy R., Phillips, *Knowlton*; sandy shore of Sandy R., Farmington, *Knowlton*; shore of Androscoggin R., Gilead, *Furbish*; ledgy shore of Kennebec R., Waterville, *Fernald*, no. 2611. NEW HAMPSHIRE: sands and gravels of Pemigewasset R., Plymouth, *Faxon*, *Fernald*, no. 11,738, *Knowlton*; sandy and gravelly beach of Pemigewasset R., Ashland, *Fernald*, no. 15,242; argillaceous ledges by Connecticut R., Bath, *Fernald*, no. 15,544; sandy and rocky shores of Connecticut R., Planfield, *Egglesston*; gravelly bank of Connecticut R., Walpole, *Fernald*, no. 123, *Blanchard et al.* VERMONT: gravel of White R., Hartland, *Knowlton*; Hartland, *Egglesston*, no. 1984; Bellows Falls, *Egglesston*, no. 2673; sandy banks of West R., Newfane, *Grout*. MASSACHUSETTS: bank of Deerfield R., Charlemont, *Hunnewell, Macbride & Torrey*. ONTARIO: vicinity of Ottawa, *Rolland*, no. 7159.

P. SUSQUEHANAE Willd. Enum. Pl. Hort. Berol. 519 (1809). *P. cuneata* Raf. Ann. Nat. 11 (1820); Bailey, Cult. Native Plums and Cherries, 63 (1892); Wight, Native Am. Sp. Prunus, 67 (1915). *P. pumila*, var. *cuneata* (Raf.) Bailey, Cycl. Am. Hort. 1451 (1901).

The following are characteristic specimens. MAINE: Fryeburg, *J. Blake*; sandy shore of Lovewell P., Fryeburg, *Farlow*; South Poland, *Furbish*; Brunswick, *Furbish*; common and characteristic on dry sandy barrens, Limington, *Fernald*, *Long & Norton*, no. 13,944. NEW HAMPSHIRE: sandy margin of West Ossipee P., *Wm. Boott*; with *Hudsonia* on shore of L. Ossipee, *Farlow*; border of pitch pine woods, Ashland, *Fernald*, no. 15,240; hillside, open hard woods, Derry, *Batchelder*; borders of sandy woods, Nashua, *Robinson*, no. 712. VERMONT: sand plain, Essex Junction, *Knowlton*; sand banks, Burlington, *Egglesston*, nos. 7 and 1982; sand plain, Colchester, *Blake*, no. 2143. MASSACHUSETTS: low ground near Bartholemew's P., Peabody, *Sears*; gravel pit, Lowell Junction, *Pease*, no. 2450; dry bank, Tewksbury, *Knowlton*; Concord, *Hoar*; sandy hill, Wilmington,

Williams et al.; rocky roadside, Woburn, *Pease*, no. 7659; clearing in dry woods, Walpole, *Rich*; Powisset Cliff, Dover, *Pease*, no. 7747; Hawk Hill, Blue Hills, *Kidder*; rocky shrubby hill, Sharon, *Williams*; dry ground, Norfolk, *Ware et al.*; sandy woods, Franklin, *Hunnewell*; dry sandy clearing, Lakeville, *Fernald & Long*, no. 9707; open sandy soil near Darby Station, Plymouth, *Fernald, Hunnewell & Long*, no. 9708; sand plain, Montague, *Fernald et al.*; wet sand by Connecticut R., *Gill, St. John & Weatherby*; dry ledges at summit of Mt. Tom, *Forbes & Wheeler*; sand, Southwick, *Murdoch & Schweinfurth*; Alum Hill, Sheffield, *Hoffmann*. RHODE ISLAND: dry soil, Cumberland, *Knowlton*; Providence, *Williams*. CONNECTICUT: Plainville, *L. Andrews*, no. 222; sandy roadside, Southington, *Bissell*, no. 194; exposed top of Wolcott Mt., Southington, *Blewitt*, no 1734; dry exposed ledges, Waterbury, *Blewitt*, no. 205. NEW YORK: Ausable Point, *Eggleson*; sandy thicket, Albany, *House*, no. 6046; South Hill, Ithaca, *F. C. Curtice*; hummocks, South Hill Marsh, Ithaca, *Eames & Wiegand*, no. 2671. NEW JERSEY: high rocky hills, High Point, *Mackenzie*, no. 4197. PENNSYLVANIA: serpentine barrens, near Pleasant Grove, Lancaster Co., *Heller & Small*. MICHIGAN: sandy ground near Au Gres, Arenac Co., *Dodge*, no. 4; Agricultural College, *Wheeler*; sand dunes by L. Michigan, Indiana Harbor, *Hill*, no. 117. WISCONSIN: sandy ridges and shores, *Schuette*. MINNESOTA: Spring Grove, *Rosendahl*, no. 307. MANITOBA: Lake Winnipeg Valley, *Bourgeau*.

GRAY HERBARIUM.

NOTES ON NEW ENGLAND HEPATICAE,—XVII.¹

ALEXANDER W. EVANS.

IN the fifth series of these Notes² the writer recognized the genus *Ricciella* A. Br. as valid, separating it from *Riccia* L. on the basis of certain anatomical differences in the thallus. It has since been demonstrated that these differences are inconstant and that the genus *Ricciella* ought not to be maintained.³ The four New England species referred to *Ricciella* should therefore be known as *Riccia crystallina* L., *Riccia fluitans* L., *Riccia membranacea* Gottsche & Lindenb. and *Riccia Sullivantii* Aust.

Another genus based on equally vague anatomical characters is *Neesiella* Schiffn., of which two species, *N. pilosa* (Hornem.) Schiffn.

¹ Contribution from the Osborn Botanical Laboratory.

² RHODORA 9: 56. 1907.

³ See Evans, Bryologist 25: 81. 1922. See also Howe, North Am. Flora 14: 11 1923.

and *N. rupestris* (Nees) Schiffn., have been reported from New England.¹ This genus should be included in the genus *Grimaldia* Raddi, and the New England species should be known as *G. pilosa* (Hornem.) Lindb. and *G. rupestris* (Nees) Lindenb.²

In the present series of Notes the nomenclature of *Fossombronia brasiliensis* is considered, *Bazzania denudata* is recognized as a valid species and compared with the closely related *B. tricrenata*, certain species recently segregated from *Scapania nemorosa* are discussed, and a species of *Lejeunea* is reported for the first time from New England. In conclusion a few additions to local state floras are reported and a revised census of New England Hepaticae is given.

1. *FOSSEMBRONIA BRASILIENSIS* Steph. Mém. Herb. Boissier 16: 28. [Sp. Hepat. 1: 382.] 1900. *F. angulosa* Aust. Hep. Bor.-Amer. 119. 1873 (not Raddi). *F. salina* Lindb. Acta Soc. Sci. Fenn. 10: 583. 1875 (*nomen subnudum*); Evans, RHODORA 3: 9. 1901. In the place last cited *F. salina* was first definitely reported from Connecticut and from New England. A few years ago³ a number of additional stations from a wide range of territory were recorded, extending the known distribution of the species into the West Indies. At the same time the very close relationship between *F. salina* and *F. brasiliensis* was emphasized, and it was pointed out that the only important difference between them (according to the published descriptions) was in the inflorescence, *F. salina* being monoicous, while *F. brasiliensis* was said to be dioicous. It was further pointed out that the name *F. brasiliensis*, on account of Lindberg's inadequate publication of *F. salina*, would have to be maintained, if it should ever be proved that Stephani's plant was really monoicous and that the two species were therefore synonymous. As a matter of fact Schiffner⁴ had already demonstrated a monoicous inflorescence in *F. brasiliensis*, stating that the antheridia and archegonia were irregularly mixed together on the upper surface of the stem, and on the basis of his account the reduction of *F. salina* to synonymy would have been justified. In order to be quite certain of this reduction, however, the writer has examined three Brazilian specimens of *F. brasiliensis* from the Boissier Herbarium at Geneva, kindly sent for study by Professor Chodat.

¹ See Evans, RHODORA 14: 210, 1912; 16: 64. 1914.

² See Bryologist 22: 57. 1919. Also North Am. Flora 14: 43. 1923.

³ Bryologist 17: 87. 1914.

⁴ Oesterr. Bot. Zeitschr. 61: 326. 1911.

These specimens are the following, the first being presumably the type of the species: Apiahy, *Puiggari* 82; Santa Catharina, *Ule* 51; and Rio de Janeiro, *Ule* 108. In the first two of these specimens spores are present and agree in all essential respects with those of *F. salina* from the United States and elsewhere. Any doubt regarding the identity of the two species is thus dispelled.

The known range of *F. brasiliensis* now extends from southern New England to Brazil. Many new stations have come to light during the past few years, of which the following are perhaps of particular interest: Kyle, Texas, *F. McAllister* 1; near Guadalajara, Mexico, *Barnes & Land* 150; Santa Ana, Isle of Pines, Cuba, *Britton & Wilson* 15684; Maricao, Porto Rico, *E. G. Britton* 4103; Port of Spain, Trinidad, *R. Thaxter*; and Arima, Trinidad, *Britton, Britton & Brown* 2399. In New England the species is still known with certainty only from Connecticut. In the writer's revised list of New England Hepaticae,¹ it is listed with a "—" sign from Rhode Island, on the basis of an old record for "*F. angulosa*" in Bennett's Catalogue. In June, 1922, Miss Annie Lorenz collected at Gloucester in the same state a large sterile *Fossombronia* that probably represents *F. brasiliensis*, but it would be wisest not to report it definitely from Rhode Island until plants with capsules have been found.

2. *BAZZANIA TRICRENATA* (Wahlenb.) Trevis. Mem. Ist. Lomb. 13: 414. 1877. *Jungermannia tricrenata* Wahlenb. Fl. Carpat. 364. 1814. Other synonyms will be noted below. On rocks. Maine: tableland, Mt. Katahdin, 4300 ft. alt., *A. Lorenz* (new to Maine, the author's earlier record having been based on the following species). New Hampshire: Mt. Washington: *J. A. Allen, W. G. Farlow, Underwood & Cook, A. W. E.*; Mt. Monroe, *A. W. E.*; Lakes of the Clouds, *J. A. Allen, A. W. E.*; Mt. Adams, *W. G. Farlow*; Kings Ravine, *A. Lorenz* 62, *A. W. E.*; Crystal Cascade, White Mountains, *Underwood & Cook* (distributed in Hep. Amer. 53, as *B. deflexa*); Carter Notch and Dome, *A. W. E.*; Flume, *C. C. Haynes, A. Lorenz & A. W. E.*; Bear's Cave, Franconia Notch, *E. Faxon, Jackson, J. A. Allen*. Vermont: Mt. Mansfield, *W. G. Farlow, A. W. E.* The species has been listed from New Hampshire and Vermont by the writer (RHODORA 5: 171. 1903, as *B. triangularis*; 10: 190. 1908; 15: 23. 1913), while Miss Lorenz has definitely reported the Flume specimens (Bryologist 11: 114. 1908). The specimens in Austin's

¹ RHODORA 15: 22. 1913. See also RHODORA 14: 224. 1912.

Hep. Bor.-Amer. 80, distributed as *Mastigobryum deflexum*, are likewise referable to *B. tricrenata*; they were collected on "rocks on the higher mountains" and probably came from New Hampshire. The species is known also from West Ranton, Newfoundland, A. E. Waghorne 163, 164, and from Mt. Albert, Gaspé County, Quebec, J. A. Allen 27, J. F. Collins 4202 (see Evans, Bryologist 19: 29. 1916), but most of the other records from eastern North America were based on the next species.

The wide range of variability exhibited by *B. tricrenata* has long been recognized. Its extreme forms are so different in appearance that they would undoubtedly be considered distinct species if they were not connected by imperceptible intergradations. In its more typical development, as represented by the figures of Macvicar¹ and Müller,² the characters are distinct and striking. The plants are pigmented with brown, sometimes very deeply so, and grow in compact mats or scattered among mosses. The individual stems tend to be suberect; they give off numerous flagelliform branches from the axils of the underleaves and occasional lateral branches of the *Fralan*ia type, the latter forming narrow angles with the stem. The ovate-triangular and persistent leaves are approximate or imbricate and are strongly convex, when seen from above; the dorsal base is rounded or subauriculate; and the apex shows three sharp teeth separated by narrow sinuses, the acroscopic tooth projecting slightly beyond the others. The underleaves are distant to approximate and quadrate-orbicular in outline; the apex is broad and truncate and shows four rounded to acute teeth more or less clearly; while the slightly bulging sides are entire or vaguely toothed. Diverging from this type are forms in which the leaves are distant, less convex, and acute or bidentate; while the underleaves may have only two or three vague teeth or be almost entire. It is not unusual, in fact, for a branch of a typical plant to exhibit divergent features of one sort or another.

The most thorough attempt to define and describe the numerous varieties and forms of *B. tricrenata* was made in 1838 by Nees von Esenbeck,³ who discussed the species under the name *Herpetium deflexum*. He recognized five subdivisions of the first rank (or varieties), giving them the names α *tricrenatum*, β *implexum*,

¹ Student's Handb. British Hepaticæ 317. f. 1-4. 1913.

² Rabenhorst's Kryptogamen-Flora 6²: f. 76. 79. 1914.

³ Naturgeschichte der europ. Lebermoose 3: 57-74. 1838.

γ *devexum*, δ *flaccidum*, and ϵ *pygmaeum*, but acknowledging their unstable character. Under the first of these he recognized subdivisions of a lower rank (forms and sub-forms), giving them the names α 1 *commune*, α 1*. *fuscum* and α 2 *elongatum*; under the second he recognized the subdivisions β 1 *laxius*, β 2 *innovans*, β 2* *julaceum* and β 3 *gemmaiparum*; but under the others, γ , δ and ϵ , he distinguished no lower subdivisions. As synonyms of certain of these subdivisions he cited the following species, which had been either published by earlier writers or distributed in exsiccatae under manuscript names. *Jungermannia tricrenata* Wahlenb. (1814), under α 1; *J. triangularis* Schleich. (1805), *nomen nudum*, under α 1 and α 1*; *J. deflexa* Mart. (1817), under α 1*; *Pleuroschisma flaccidum* Dumort. (1831), under β 1; *P. parvulum* Dumort. (1831), under β 2; and *Jungermannia flaccida* Schleich. (1821), *nomen nudum*, under δ . He chose the name *deflexum* for the species, rather than *tricrenatum*, on account of an inaccuracy in the original description of *Jungermannia tricrenata*; but of course this would not now be considered a sufficient reason for invalidating Wahlenberg's species.

Nees von Esenbeck's subdivisions were taken over bodily in the Synopsis Hepaticarum (1845), where the species appears under the name *Mastigobryum deflexum* Nees. They were adopted also by Lindenberg and Gottsche in their monograph of *Mastigobryum*,¹ published a few years later, the subdivisions α 1, α 2, β 1, β 2*, γ , δ and ϵ being separately illustrated on their plate. The more typical condition of the species, as described above, is clearly shown by *f. 1-4*, which illustrate α 1 *tricrenatum commune*. Subsequent writers have either ignored Nees von Esenbeck's subdivisions altogether or have used his names very sparingly.

For many years the species continued to be known by the name *Mastigobryum deflexum*, but this name has gradually been superseded by other names. By those who recognize the genera of S. F. Gray the name *Bazzania tricrenata* is usually employed. In 1875, however, Lindberg² revived for the species the old specific name *triangularis* of Schleicher, forming the combination *B. triangularis* (Schleich) Lindb. He apparently dated the name from the year 1805, when Schleicher distributed specimens of *Jungermannia*

¹ Spec. Hepat. *Mastigobryum* 108. pl. 18. 1851.

² Acta Soc. Sci. Fenn. 10: 499. 1875.

triangularis in his Plant. Crypt. Helvetae. Since it is now admitted¹ that Schleicher's *J. triangularis* is a *nomen nudum*, Lindberg's combination *B. triangularis*, of 1875, represents the first adequate publication of the specific name *triangularis* for the plant in question and should not be allowed to replace the name *tricrenata*, which clearly dates from 1814.

1900 Pearson² added to the nomenclatorial difficulties involved by recognizing both *B. tricrenata* and *B. triangularis* as valid species. He listed, as synonyms of the latter, *Jungermannia triangularis* Schleich. and *J. deflexa* Mart. According to Nees von Esenbeck, however, as already pointed out, both of these species are synonyms of his *Herpetium deflexum* α *tricrenatum*, under which he naturally cites, as another synonym, *J. tricrenata* Wahlenb. It would appear therefore that *J. triangularis* and *J. deflexa* should both be cited as synonyms of *Bazzania tricrenata*, when this is accepted as a valid species, and there is nothing in Lindberg's writings to indicate that he ever interpreted his *B. triangularis* in a different and more restricted sense. Pearson's *B. triangularis* of 1900 thus becomes a homonym of Lindberg's *B. triangularis* of 1875, in case each represents a distinct species.

The validity of Pearson's species, however, is not above question, and it is not at all certain that it represents a definite and clearly defined series of forms. According to his observations it differs from *B. tricrenata* in the following respects: the plants are smaller; the stems are more slender and usually, but not invariably, dichotomously "innovantly" branched; the leaves, which soon fall away, are proportionately shorter (except in the var. *flaccida*); the leaf cells are "rounder," with large and distinct trigones; and the underleaves are patulous and usually subentire. In the var. *flaccida* the leaves are described as narrower and often entire and apiculate. Except for the fact that the leaves are said to be caducous, instead of persistent, these differences might well come within the range of variability of such a species as *B. tricrenata*, and Pearson himself questions whether his *B. triangularis* may not be either the male plant or a mere variety of *B. tricrenata*.

As a matter of fact the specimens cited under *B. triangularis* do not all show the caducous habit. In the material from Tyn-y-groes

¹ See Evans, *RHODORA* 10: 190. 1908.

² *Hep. British Isles* 130, 132. *pl. 48, 49.* 1900.

in Wales, for example (Carrington & Pearson, Hep. Brit. Exsic. 124), which Pearson used for most of his illustrations, the leaves are distant and often greatly reduced in size but show no evidence of falling away. His other figures were drawn from specimens collected by Jack in Baden (Gottsch & Rabenhorst, Hep. Europ. 198, 401); the first was distributed under the name "*Mastigobryum deflexum* var. β *flaccidum* Nees" and the second under the name "*M. deflexum* β *implexum*." Both show caducous leaves to a greater or less extent and also differ from the Welsh specimens in other respects.

In 1912 Macvicar¹ followed the example of Pearson and recognized both "*Bazzania tricrenata* (Wahl.) Pears." and "*B. triangularis* Pears.," dating them from the year 1900. According to his account *B. triangularis* "can generally be separated in Britain without difficulty from *B. tricrenata*," and "the typical forms of the two plants never grow in the same patch." He described two principal forms of *B. triangularis* and a third, apparently less important, form. In the first the leaves are mostly distant, never falcate, and usually (but not always) acute, while the underleaves are oblong-quadrate and entire; in the second the leaves are approximate, sometimes falcate, and often two- or three-toothed at the apex; in the third the leaves are narrow, nearly flat, and frequently three-toothed. He brings out the additional fact that the cells of *B. tricrenata* are 24–30 μ in diameter, while those of *B. triangularis* are only 16–25 μ , but makes no allusion to the early falling away of the leaves. His illustrations clearly represent the first of his three forms, which is essentially like the Welsh plant figured by Pearson, while his second and third forms would agree better with Jack's Baden specimens.

In 1914 Schiffner distributed specimens of *Bazzania triangularis* (Schleich.) Lindb. and "*B. tricrenata* (Wahlenb.) Pears." in his Hep. Europ. Exsic. 637–650 and commented on them in the thirteenth series of his "Kritische Bemerkungen."² He expresses the opinion that these species are distinct in Scotland, but connected by transitional forms in the mountains of Central Europe. Under *B. triangularis* he issued Scotch specimens, illustrating Macvicar's first form, as forma *laxa*; French and Italian specimens, illustrating his second form, as forma *densior*; and Bohemian specimens, representing a new var. *intercedens*, stating, in regard to the last, that it might

¹ Student's Handb. British Hepaticae 317, 318. 1912.

² Privately printed at Gottesberg, Silesia.

perhaps be better referred to *B. tricrenata*. In connection with the Italian specimens of his forma *densior* he emphasized the fact that the leaves were very caducous and implied that this condition was distinctive of *B. triangularis*. Under *B. tricrenata* he distinguished, in addition to the typical form, the vars. *subintegristipula* Schiffn., *cavernarum* Schiffn. and *pratensis* Schiffn., the last two being proposed as new. It is unfortunate that he made no attempt to correlate these varieties with the subdivisions of Nees von Esenbeck.

In contrast to the views of Pearson, Macvicar and Schiffner, those of Stephani may be cited. In discussing "*Mastigobryum triangularare* (Schleicher)"¹ in 1908, he made no mention of "*Bazzania triangularis* Pears." but listed both *Jungermannia triangularis* Schleich., and *J. tricrenata* Wahlenb. as synonyms. He alluded to a wholly etiolated forma "*implexa*" but gave no description of it and even denied its varietal rank on the ground that it was merely dwarfed by unfavorable environmental conditions. Müller takes an intermediate position between these extremes. In 1913 he described a "var. *implexa* (Nees) under *Pleuroschisma tricrenatum* (Wahlenb.) Dumort."² citing "*Bazzania triangularis* Pearson" as a synonym. In this variety he emphasized the scarcely convex and distant leaves, that easily become detached, and the squarrose orbicular underleaves; and he stated further that the variety was so distinct that it might at first sight be considered a valid species, except for the presence of intermediate forms connecting it with typical *P. tricrenatum*. He admitted, however, that these connecting forms were infrequent, even in Central Europe. Müller's figure of the var. *implexa* agrees on the whole with Lindenbergs and Gottsche's figures of *Mastigibryum deflexum* β 1 *implexum laxius* (*f. 11-13*) and represents Schiffner's forma *densior* of *B. triangularis*, rather than his forma *laxa*.

It will be seen from the above citations that European writers are still at variance with regard to *B. tricrenata*, and that those who segregate off "*B. triangularis* Pears." do so somewhat tentatively. It will be seen further that those who do recognize *B. triangularis* include under it not only forms with caducous leaves but also slender forms with persistent leaves (the forma *laxa* of Schiffner). In the writer's opinion the presence of caducous leaves is a feature of considerable importance from a taxonomic standpoint. Such leaves represent a

¹ Bull. Herb. Boissier II. 8: 851. 1908.

² Rabenhorst's Kryptogamen-Flora 6²: 270. f. 80. 1913.

form of vegetative reproduction, comparable with the gemmae found in other genera of the Hepaticae. It is admitted that the presence or absence of gemmae in certain cases affords a convenient method for distinguishing between closely related species. The gemmiparous habit of *Lophozia heterocolpa* (Thed.) M. A. Howe, for example, makes it possible to separate this species at a glance from *L. Muellieri* (Nees) Dumort., in which gemmae are unknown. If this reasoning is applied to caducous leaves (Bruch- or Brutblätter of Correns) their presence, if supported by morphological features of even a slight character, might well be made the basis for the segregation of plants showing this feature from a species in which the leaves are clearly persistent. In Schiffner's forma *densior* of "*Bazzania triangularis* Pears." and in Müller's var. *implexum* of *Pleuroschisma tricrenatum* these conditions are apparently realized. The forms designated by these names are clearly identical and differ from typical *B. tricrenata* not only in having caducous leaves but also in certain features of the leaves themselves. Instead of being strongly convex and narrowing rather abruptly from a broad and rounded or subauriculate base, these leaves are plane or only slightly convex and taper more gradually from a narrower and scarcely rounded base. In connection with the var. *implexum*, Boulay¹ makes the interesting observation that it descends from the higher mountains into the lower woody zone, while the typical form does not descend below the middle woody zone. There is thus a slight difference in altitudinal distribution to support the morphological differences.

If a species of the character just outlined is recognized, the choice of a name for it is beset with difficulties. "*B. triangularis* Pears." should apparently be typified by the forma *laxa* of Schiffner with persistent leaves, but the use of this name in any sense would lead to confusion on account of the older *B. triangularis* Lindb. Nees von Esenbeck's *Herpetium deflexum* β *implexum* was probably a mixture of several forms, but his β 1 *implexum laxius* was apparently the same as Müller's *Pleuroschisma tricrenatum* var. *implexum*. Under β 1 Nees von Esenbeck, as shown above, included *Pleuroschisma flaccidum* Dumort. as a synonym, and Dumortier's description² certainly agrees with Müller's, except that no mention is made of caducous leaves. If it could be established that these were present

¹ Muscines de la France 2: 50. 1904.

² Syll. Jung. 71. 1831.

in Dumortier's plant, the specific name *flaccida* would become available; otherwise some other choice would have to be made.

According to our present knowledge the true *B. tricrenata* is largely restricted in eastern North America to the higher mountains of Quebec and New England. It is usually replaced at lower altitudes by a species in which the caducous habit of the leaves is even better marked than in the European "*Pleuroschisma tricrenatum* var. *implexum*." An account of this species follows.

(To be continued.)

EMPETRUM NIGRUM L., forma **purpureum** (Raf.), n. comb. *E. purpureum* Raf. New Fl. pt. iii. 50 (1836) as to description. *E. rubrum* Durand, Proc. Acad. Sci. Phila. (1863) 95, not Vahl. *E. nigrum*, var. *purpureum* (Raf.) DC. Prodr. xvi. pt. 1: 26 (1869); Simmons, Vasc. Pl. Ellesmerel. 43 (1906); Fernald & Wiegand, RHODORA, xv. 212 (1913).

As pointed out by Professor Wiegand and me in 1913 there has always been great doubt as to what Rafinesque had from Labrador as his basis for *E. purpureum*. His description called for *E. nigrum* with purple fruit, but we had never met such a plant. On July 22, 1922, however, while exploring the almost unknown region of Mt. Logan in Matane County, Quebec, Professor A. S. Pease and I found that the *Empetrum nigrum* on bare hornblende-schist ledges near the summit (about 1100 m.) of Mt. Fortin¹ had the ripe berries purple. This shrub, the first I had met agreeing with Rafinesque's account, was clearly *E. nigrum* in all characters except that its berries were not black. It was obviously only a color-form.—M. L. FERNALD, Gray Herbarium.

¹ Mt. FORTIN is the bare-topped mountain to the northeast of the main ridge of the Mt. Logan range and separated from Mt. Logan by a great basin, through which flows Ouillet Brook, and at the east or head of the basin by a pass with an elevation of about 3000 feet where are found a small sphagnum-carpeted pond (DRY POND of our field notes), which is a source of Ouillet Brook, and to the east a small spring-fed lake which empties to the south around the abrupt eastern end of Mt. Logan. We estimated the summit of Mt. Fortin at about 3600 feet (1100 m.). We were glad to associate with it the name of our guide, M. Joseph Fortin of Ste. Anne des Monts, who, with M. Samuel Coté and other guides, had accompanied Professor J. F. Collins and me to Mts. Albert and Tabletop in 1905 and 1906, and who had guided Professor A. P. Coleman in the Shickshock Mts. in 1918 (see Coleman, *Physiography and Glacial Geology of Gaspe Peninsula, Quebec*.—Canad. Dept. Mines, Geol. Surv. Bull. No. 34: 30 (1922)).

EUPHRASIA CANADENSIS IN VERMONT.—In Bulletin No. 3 (1908) of the Vermont Botanical Club, Professor M. L. Fernald called attention to the fact that *Euphrasia canadensis*, unknown in Vermont, occurs in the White Mountain region and had recently been found by Judge Churchill near the Vermont boundary in Quebec. It will, therefore, interest Vermont botanists to know that the plant is quite abundant in hillside pastures in parts of Richford, Montgomery and Enosburg. I have sent specimens to Mr. G. L. Kirk of Rutland.—FRANCIS H. SARGENT, Wolfeboro, New Hampshire.

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